

NEVADA MINING ASSOCIATION

DPM Workshop

January 24 & 25, 2007

Reno, Nevada



Introduction

- **Brief History of the Detroit Salt Mines**
- **Ventilation Systems**
- **Equipment**
- **Baseline DPM Studies**



History of the Mine

- **Underground Salt Mine in an Urban Area**
- **1st Shaft was sunk in 1906**
- **2nd Shaft was sunk in 1920**
- **Ran Electric Equipment till 1950 and then ran a mix of diesel and electric.**
- **1200 ft (366m) in depth**
- **Room and Pillar Mining Method is Employed**
- **6,000 Tons per Day**

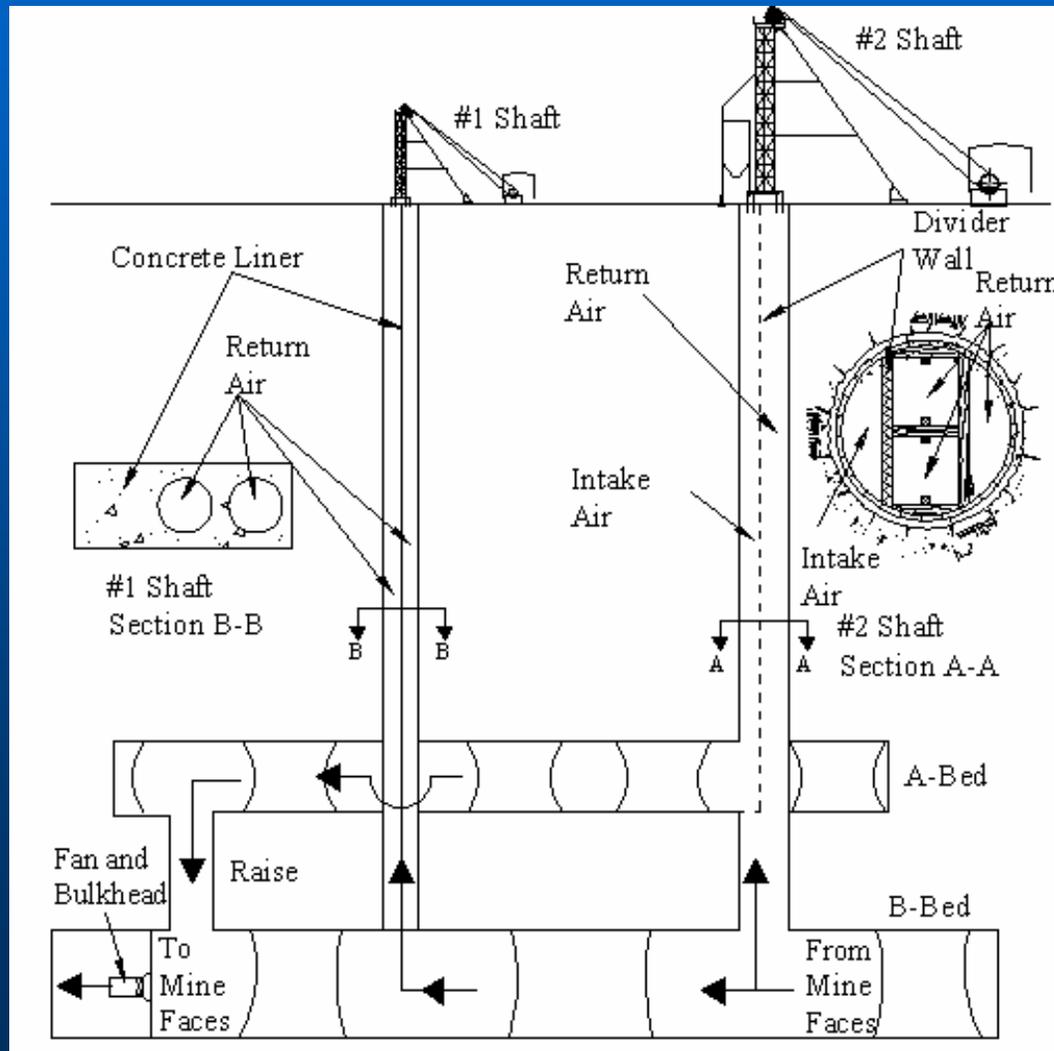








Detroit Mine Operates Under A Two Shaft Ventilation System



Detroit Salt Mine Main fan

- Jeffery Model 8HU-60
- Operates at 7.1 in of Total Pressure
- Generates 127,000 cfm.
- 200 Hp Motor



In June 2001, a joint MSHA / Industry protocol led to MSHA conducting baseline DPM studies of 31 Metal/Nonmetal underground mines.



Detroit Salt Company Mining Equipment

Mobile Equipment

<u>Equipment Type</u>	<u>No.</u>	<u>Rated Hp</u>
Undercutter	3	N/A
Drills	2	200
Powder Rig	1	113
Scaler	1	113
Loader	4	325



Detroit Salt Company

Baseline DPM exposure

<u>Date</u>	<u>Location</u>	<u>Job Type</u>	<u>TC</u> <u>µg/m³</u>	<u>EC</u> <u>µg/m³</u>
12/4/2001	UG	Powder Men	719	366
12/4/2001	UG	Powder Men	656	329
12/4/2001	UG	Air Intake	72	42
12/4/2001	UG	Powder Rig	1024	458
12/4/2001	UG	Cross-cut	435	305
12/4/2001	UG	Cross-cut	466	305
12/4/2001	UG	Loader	926	458
12/4/2001	UG	Loader	803	383
12/4/2001	UG	Loader	708	383



Detroit Salt Mine Ventilation Changes

- **Constructed near leak resistant air walls in intake air coarse.**
- **Construct leak resistant pressure walls on the pressure side of the fan**
- **Removed high velocity shock loss from air intake shaft**



Detroit Salt Mine

Leak resistant air walls in fresh air system



Detroit Salt Mine ABC Brattice Wall in fresh air system



Detroit Salt Mine

Completed High Pressure air wall with shot-crete



Detroit Salt Mine

High Pressure air wall during construction



Removal of Intake Shaft shock loss



MSHA Detroit Salt Company_DPM Results Post Ventilation Modifications

<u>Date</u>	<u>Location</u>	<u>Job Type</u>	<u>Contaminate</u>	<u>Conc'n</u>	<u>PEL</u>
12/17/2003	UG	Powder Gang	TC	446	400
12/17/2003	UG	Drill Operator	TC	445	400
12/17/2003	UG	Loader Operator	TC	241	400
12/17/2003	UG	Loader Operator	TC	201	400
12/17/2003	UG	Powder Rig	TC	510	400
12/17/2003	UG	Drill Operator	TC	497	400
12/17/2003	UG	Loader Operator	TC	273	400
12/17/2003	UG	Loader Operator	TC	221	400
3/2/2004	UG	Powder Rig	TC	407	400
3/2/2004	UG	Drill Operator	TC	366	400
3/2/2004	UG	Loader Operator	TC	289	400
3/2/2004	UG	Undercutter	TC	259	400
3/2/2004	UG	Powder Rig	TC	469	400
3/2/2004	UG	Drill Operator	TC	431	400
3/2/2004	UG	Drill Operator	TC	276	400
3/2/2004	UG	Undercutter	TC	105	400



Detroit Salt Mine's Diesel Equipment



Detroit Salt Company 2005 - 2003

Introduction B-100

MSHA

Personal Health Sampling Results

Mine ID: 2000552

Operator: Detroit Salt Company LLC

<u>Date</u>	<u>Location</u>	<u>Job Type</u>	<u>Contaminate</u>	<u>Conc'n</u>	<u>PEL</u>
8/10/2005	UG Active Production	Undercutter	TC	143	308
8/10/2005	UG Active Production	Powder Gang	TC	112	308
8/10/2005	UG Active Production	Front-end Loader	TC	61	308
12/8/2004	UG Active Production	Powder Gang	TC	158	400
12/8/2004	UG Active Production	Drill Jumbo Operator	TC	137	400
12/8/2004	UG Active Production	Front-end Loader	TC	71	400
3/2/2004	UG Active Production	Undercutter	TC	386	400
3/2/2004	UG Active Production	Front-end Loader	TC	289	400
3/2/2004	UG Active Production	Undercutter	TC	259	400
12/17/2003	UG Active Production	Powder Gang	TC	446	400
12/17/2003	UG Active Production	Jumbo Drill operator	TC	445	400
12/17/2003	UG Active Production	Front-end Loader	TC	241	400
12/17/2003	UG Active Production	Front-end Operator	TC	201	400



Cannon Jumbo Drill



980G Caterpillar Front End Loader 325 Hp



Getman Roof Scaler

113 Hp Deutz Electronic Motor



Getman Powder Machine 113 Horsepower Deutz Motor



B-100 Soy Fuel Facts

- **78% Less Co₂ In Emission**
- **90% reduction In Un-burnt Hydro-Carbons**
- **11% O₂ By Weight**
- **7 -9% lower BTU Content (#2 Diesel)**
- **30% Greater Lubricity**
- **Contains No Sulfur**
- **Flash Point 260° vs. 117°**
- **Bio-Degradable, Non Toxic**



Discussion of Results

From use of B-100 Soy Fuel

- Using a 99% to 100% clearly reduced the DPM Exposures values in the Detroit Salt Mines by as much as 80%
- Exhaust from diesel engines is clear, black soot problems are nearly eliminated
- The 99-100% fuel acts as a detergent therefore fuel filters will have to be changed until the system is clean or start with clean tanks on the machine and the storage tanks
- Older or cracked rubber hoses will need to be replaced because this fuel will leak through them, use fatty acid resistant hose.
- The Soy fuel will eat paint when spilled
- Current supply is subsidized by US Government and is limited



Detroit Salt Company

2006 MSHA DPM Sample Results

<u>Date</u>	<u>Location</u>	<u>Job Type</u>	<u>Contaminate</u>	<u>Conc'n</u>	<u>PEL</u>
1/3/2006	UG	Drill Operator	TC	185	308
1/3/2006	UG	Powder Crew	TC	359	308
3/16/2006	UG	Powder Crew	TC	59	308
12/5/2006	UG	Loader Operator	TC	196	308
12/5/2006	UG	Drill Operator	TC	146	308
12/5/2006	UG	Powder Crew	TC	125	308



Conclusions

- **The use of Soy as a fuel source in diesel equipment in this underground mine has dramatically lowered DPM reading.**
- **The use of Biodiesel (Soy) in 100% - 99% by volume has shown no ill effects to engine performance, horse power, cooling.**
- **However Bio-Diesel quality & quantity delivered to mine site continues to be an issue.**
- **B-100 in May 2004 =\$1.05 / gal**
- **B-100 in June 2006 \$3.69 / gal**





Biodiesel Production Plants Under Construction or Expansion (September 12, 2006)

